

What is claimed is:

1. A vaccine for stimulating or enhancing in a subject to which the vaccine is administered, production of an antibody which recognizes a ganglioside, comprising an amount of ganglioside or oligosaccharide portion thereof conjugated to an immunogenic protein effective to stimulate or enhance antibody production in the subject, an effective amount of adjuvant and a pharmaceutically acceptable vehicle.
2. The vaccine of claim 1, wherein the subject is a human.
3. The vaccine of claim 1, wherein the ganglioside or oligosaccharide portion thereof is conjugated to Keyhole Limpet Hemocyanin or a derivative of Keyhole Limpet Hemocyanin.
4. The vaccine of claim 3, wherein the adjuvant is QS-21.
5. The vaccine of claim 3, wherein the ganglioside is selected from the group consisting of GM2, GM3, GD2, GD3, GD3 lactone, O-Acetyl GD3 and GT3.
6. The vaccine of claim 3, wherein the ganglioside is GM2.
7. The vaccine of claim 3, wherein the ganglioside is GD3.
8. The vaccine of claim 5, wherein the effective amount of conjugated ganglioside or conjugated

- 145 -

ligosaccharide portion thereof is an amount between about 1  $\mu$ g and about 200  $\mu$ g.

- 5 9. The vaccine of claim 8 wherein the effective amount of conjugated ganglioside or conjugated oligosaccharide portion thereof is an amount between about 50  $\mu$ g and about 90  $\mu$ g.
- 10 10. The vaccine of claim 9 wherein the effective amount of conjugated ganglioside or conjugated oligosaccharide portion thereof is about 70  $\mu$ g.
- 15 11. The vaccine of claim 8 wherein the effective amount of conjugated ganglioside or conjugated oligosaccharide portion thereof is between about 1  $\mu$ g and about 10  $\mu$ g.
- 20 12. The vaccine of claim 11 wherein the effective amount of conjugated ganglioside or conjugated oligosaccharide portion thereof is about 7  $\mu$ g.
- 25 13. The vaccine of claim 5, wherein the adjuvant is QS-21.
- 30 14. The vaccine of claim 4, wherein the effective amount of QS-21 is an amount between about 10 $\mu$ g and about 200  $\mu$ g.
15. The vaccine of claim 14 wherein the effective amount of QS-21 is about 100  $\mu$ g.
16. The vaccine of claim 14 wherein the effective amount of QS-21 is about 200  $\mu$ g.

- 146 -

17. The vaccine of claim 6, wherein the adjuvant is QS-21.
18. The vaccine of claim 1, wherein the subject is afflicted with cancer and the antibody produced in the subject upon administration of the vaccine effectively treats the cancer.
19. The vaccine of claim 1, wherein the subject is susceptible to cancer and the antibody produced in the subject upon administration of the vaccine effectively prevents the cancer.
20. The vaccine of claim 18 wherein cells of the cancer have gangliosides on their surface.
21. The vaccine of claim 19, wherein, cells of the cancer have gangliosides on their surface.
22. The vaccine of claim 18, wherein gangliosides are found in the stroma of the cancer.
23. The vaccine of claim 19, wherein gangliosides are found in the stroma of the cancer.
24. The vaccine of claim 18, wherein the cancer is of epithelial origin.
25. The vaccine of claim 19, wherein the cancer is of epithelial origin.
26. The vaccine of claim 18, wherein the cancer is of neuroectodermal origin.

- 147 -

27. The vaccine of claim 19, wherein the cancer is of neuroectodermal origin.

5

28. The vaccine of claim 26, wherein the cancer of neuroectodermal origin is a melanoma.

29. The vaccine of claim 27, wherein the cancer of neuroectodermal origin is a melanoma.

10

30. A method for stimulating or enhancing in a subject production of antibodies which recognize a ganglioside comprising administering to the subject an effective dose of the vaccine of claim 1.

15

45 31. The method of claim 30 wherein the ganglioside is GM2.

20

41 32. A method for treating cancer in a subject afflicted with cancer comprising administering to the subject an effective dose of the vaccine of claim 18.

25

LD 33. A method for preventing cancer in a subject susceptible to cancer comprising administering to the subject an effective dose of the vaccine of claim 19.

30

48 34. The method of claim 30, 32 or 33, wherein the ganglioside or oligosaccharide portion thereof is conjugated to Keyhole Limpet Hemocyanin or a derivative of Keyhole Limpet Hemocyanin.

49

35. The method of claim 34, wherein the adjuvant is QS-21.

- 148 -

- 56 36. The method of claim 32 or 33, wherein cells of the cancer have gangliosides on their surface.
- 51 37. The method of claim 32 or 33, wherein gangliosides are found in the stroma of the cancer.
- 52 38. The method of claim 32 or 33, wherein the cancer is of epithelial origin.
- 10 53 39. The method of claim 32 or 33, wherein the cancer is of neuroectodermal origin.
- 54 40. The method of claim 39, wherein the cancer of neuroectodermal origin is a melanoma.
- 15 55 41. The method of claim 30 wherein the administering comprises administering at two or more sites.
- 56 42. The method of claim 41 wherein the administering comprises administering at three sites.
- 20 52 43. The vaccine of claim 3, wherein the ganglioside is GD3.

ens B1]

Add C'

Add D2

Add

J